Dung beetles (Coleoptera: Scarabaeinae) in rabbit dung heaps: First report for Mesoamerica

Rabbit latrines are mounds of fecal pellets produced mainly by males for territorial purposes and for communication among family members (Sneddon 1991; Monclús and De Miguel 2003). The fecal deposits of rabbits are exploited by a rich dung beetle fauna (Coleoptera: Scarabaeoidea) on the Iberian Peninsula (Avila et al. 1988; Sánchez-Piñeiro and Ávila 1991; Galante and Cartagena 1999; Verdú and Galante 2002, 2004) and in Eurasia (see Zunino and Halfpeter in press for details) where the Old World rabbit (Oryctolagus cuniculus L.) is very common. One of the scarab genera most commonly found in rabbit droppings is Onthophagus Latreille. For Eurasia, nine species have been recorded, but only four of them are considered to be closely associated with rabbit excrement (Zunino and Halfpeter in press). For North America, there are only two records of Scarabaeinae collected in Florida from rabbit pellets: Boreocanthon probus (Germar) and Onthophagus hecate blatchleyi Brown (Woodruff 1973). There is no information on the ecological interactions between dung beetles and rabbits for Mexico, even though the Mexican Leporidae fauna is the most diverse in the Americas (15 species) and more than 50% of these species are endemic (Diersing and Wilson 1980; Hall 1981; Ruedas 1998; Hoffman and Smith 2005). In this note we present the first Mesoamerican record of the association between a dung beetle and a wild rabbit. We also describe the nest of Onthophagus lecontei (Harold) found in latrines of the Mexican cottontail, Sylvilagus cunicularius (Trin. and Rupr.) embedded in a matrix of Muhlenbergia implicates (Kunth) Trin. and Stipa ichu (Ruiz and Pavón) Kunth pastures, Aristida shiedeana (Trin. and Rupr.), Rhus sp., Standleyi sp. and allochtonous Eucalyptus globulus Labill. trees.

During July 2006, we randomly selected 40 of the 100 heaps of S. cunicularius dung pellets (latrines) in a 1 ha forest fragment. We dug these up and examined the area for dung beetles where mounds of pellets formed a latrine, as well as the adjacent soil to a depth of at least 20 cm. We also placed six baited pitfall traps in the sampling area, 25 m apart, three with 10–12 fresh rabbit pellets and three with 350 ml of cow dung. Traps were left for 48 h. We placed 15 live beetles (both sexes) in terraria and offered them O. cuniculus pellets and cow dung.

Sylvilagus cunicularius latrines consist of a mound of partially shredded pellets. Average latrine size in the study area was 4 m$^2$ ± 1.7 SD (n = 105). Pellet diameter in the Malinché National Park was 11.7 mm ± 0.13 SD (n = 9,534) (Clavijo-Gutiérrez 2007). Pellet abundance varied among dung heaps, with an average of 56 ± 97 SD pellets/heap. Latrines had pellets of all ages (i.e., from fresh to dried).

We collected 23 specimens of O. lecontei. All were adults found on rabbit dung heaps, mostly in latrines with pellets recently deposited by the wild rabbits. The beetles foraged on clusters of dung pellets more frequently than on pellets that were spread out. Most of the dispersed pellets were found in pastures or areas with abundant herbageous vegetation, but not on bare soil. No beetles were caught in the traps. We found vertical and horizontal galleries measuring 0.98 cm ± 0.10 SD × 0.5 cm ± 0.19 SD with dung sausages (less compacted than brood masses) without any eggs or larvae in them. Onthophagus lecontei exhibits Nesting Pattern I (sensu Halfpeter and Edmonds 1982) in which species construct paracoprid nests containing one or more brood masses. Females nest repeatedly and there is very little, if any, bisexual cooperation.

We found nests in 20% of the latrines examined. Twenty-five percent of the nests had eggs, 62.5% had first instars, and 12.5% had second instars. We did not see any third instars, pupae, or pupation chambers. Nests were compound subterranean and the galleries had a predominantly vertical orientation. Brood masses consisted of hemispherical sausages made from two compacted rabbit pellets that had been crumbled by the scarabs. They had no covering layer of soil. We observed only racemose nests. A nest typically had four to six brood masses measuring 0.91 cm ± 0.13 SD × 0.55 cm ± 0.12 SD. Nesting chambers were